LOW CONTAMINANT WIPER

TECHNICAL FIELD

This invention relates to the manufacturing of fabric wipers, in particular, wipers that release fewer and/or less offensive particulate contaminants while nonetheless exhibiting good sorbency and strength.

BACKGROUND OF THE INVENTION

Wipers may be made from knitted, woven or non-woven fabrics of materials such as polyester and the like. The typical manufacturing process begins with drawing and texturing continuous filament yarn. The textured yarn is knitted or woven to construct a fabric, and the fabric is washed or scoured to remove spinning oils. The fabric may be chemically modified in order to improve its wettability and performance. The fabric is then dried in a "tenter frame" oven to remove moisture and heat set the fabric. Heat setting dissipates stress in the polyester fibers and stabilizes the fabric.

Next, the fabric is cut into wipers, typically 9 inch by 9 inch squares. The wipers may remain unlaundered or may be washed in a cleanroom laundry, employing special surfactants and highly-filtered and purified water, to reduce the contamination present on the fabric. After washing, the wipers may be packaged dry in air-tight plastic bags, or pre-saturated with a suitable solvent before being packaged.

These wipers are utilized for a number of different applications, including cleaning within cleanrooms, automotive painting rooms and other environments in which particulate contaminants are undesirable. Each

different application emphasizes certain standards these types of wipers should attain. For example, for wipers utilized in cleanrooms, stringent performance standards must be met. These standards are related to sorbency and contamination, including maximum allowable particulates, unspecified extractable matter and individual ionic contaminants. The standards for particular contaminant release are especially rigorous and various methods have been devised to meet them. For example, Paley et al., U. S. Pat. No. 4,888,229 (incorporated by reference) describes a wiper having fused borders, the sealed edge of the wipers being present to reduce contamination caused by small fibers. Diaber et al., U. S. Pat. No. 5,229,181 (incorporated by reference) describes a knit fabric tube, only two edges of which must be cut and sealed, thereby reducing the contamination caused by loose fibers from the edges. Paley et al., U.S. Pat. No. 5,271,995, (incorporated by reference) describes a wiper for a cleanroom environment that has reduced inorganic contaminants through the use of a specific yarn, namely "nylon bright". Reynolds, U. S. Pat. No. 5,069,735 (incorporated by reference) describes a procedure to cut the fabric into pieces using a hot air jet in the range of 600 to 800 °F to melt the fibers, forming a sealed edge product with reduced loose fiber contamination.

Despite advantages made in reducing particulate contamination release from cleanroom wipers, further reductions in particulate release are, nevertheless, highly desirable.

SUMMARY OF THE INVENTION

According to one aspect of the invention, a low contaminant wiping cloth suitable for a wide range of applications is provided. The wiper meets substantially all of the specifications for use in cleanrooms, particularly those specifications for Class 100 clean rooms and below.

According to another aspect of the invention, a cleanroom wiper having a high liquid sorbency capacity is provided.

According to still another aspect of the invention, a wiping cloth is provided which has substantially stable edges that do not undergo substantial particulate generating fracture upon application of tensile stresses applied during normal use.

According to still another aspect of the invention, a wiping cloth is provided which incorporates yarns of substantially reduced inorganic ion content so as to reduce the effects of any particles which may be released.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will now be described by way of example only, with reference to the accompanying drawings which constitute a part of this specification and in which:

FIG. 1 is an elevation plan view of one embodiment of a wiper according to the present invention;

FIG. 2 is a view taken along line 2-2 in FIG. 1;